

Space News Roundup

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National Aeronautics and Space Administration

Viking, phone home

JPL hopes loss of contact with lander can be remedied

The window will open on the first of February, and then the 64-meter Deep Space Tracking Station near Canberra, Australia will go to work, bombarding Mars for 11 hours with a powerful signal in a critical attempt to restore communications with the Viking 1 lander, which has been out of touch with Earth for two months.

"In effect, we'll be blasting Mars with 80 to 100 KW," said Viking Team Leader George Gianopulos of the Jet Propulsion Laboratory. The nominal power of signals to the lander is 10 kilowatts, he added.

The sequence of events which led to a loss of communications with Viking is still not entirely clear, but the JPL flight team and a troubleshooting team from Martin-Marietta/Denver, which built the lander, believe they know what the problem is.

Designed for a mission of 90 days, Viking 1 has shown incredible stamina in the harsh environment of Mars, where even now one of the largest dust storms observed in many years is raging. Equipped with radioisotope thermoelectric generators, Viking has a power supply which can last for years, but the power loop also includes four nickel-cadmium batteries which last year began showing their age.

Experts designed a long term program where Viking was instructed to systematically charge and discharge its batteries in an effort to keep them functioning longer. On Nov. 19 of last year, a set of commands telling Viking to

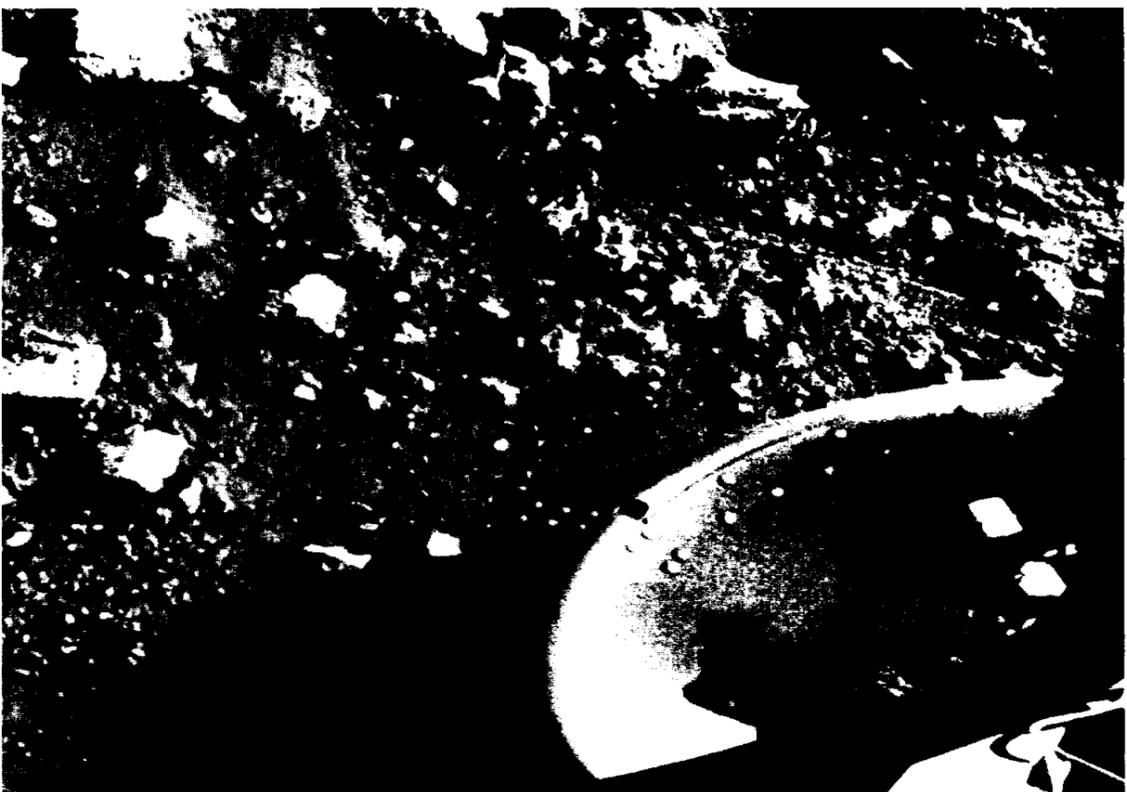
repeat this exercise apparently were fed into an area of the computer's memory which tells the lander where it is on Mars and how its antenna should track Earth. To the antenna pointing sub-routine, the codes looked like commands. At the same time, an under voltage switch apparently tripped, Gianopulos said, even as the crucial communications antenna was caused to point away from the Mars-Earth line.

"Getting into the lander to reset the low voltage switch is going to be a neat trick," he said. "We will be sweeping and commanding, sweeping and commanding throughout our entire pass with Mars on Feb. 1. If we are successful, the computer will start cycling, and a number of things including routine charging of the batteries will take place. After the batteries have charged, we will send a new set of commands to undo the undoing."

Gianopulos said initial communications with Viking will depend on the sensitivity of the antenna, "which by the way is a very good antenna." He said the powerful commands from JPL via Australia could be as much as 40° off the receiving line into the antenna dish and still be picked up.

The problems with Viking are especially disappointing at this time for three reasons, Gianopulos said. After many months, the batteries were showing improvement. "And at about the time the failure came," he said, "we were seeing temperatures on Mars go bananas."

(Continued on page 4)



This is the first photograph taken by Viking Lander I on the surface of Mars. Officials hope a communications problem with the Lander can be remedied to allow for many more.

099 leak is internal

Preliminary findings from a second test firing of the Orbiter *Challenger's* main engines Tuesday indicate an internal high pressure hydrogen leak which could cause further postponement of the launch of STS-6.

Intensive troubleshooting to find the exact source of the leak will continue, according to Lt. Gen. James A. Abrahamson, Associate Administrator for Space Flight.

Following the first flight readiness firing Dec. 17, officials at the Kennedy Space Center said they found evidence of excess hydrogen in the aft compartment of the Orbiter, but did not know if it came from an internal or external source. The second test firing, designed to answer that question, ruled out the possibility of an external source for the hydrogen, and now the task is pinpointing the cause within the main propulsion system.

Abrahamson said a third test firing, in keeping with NASA's con-

servative approach to flying new vehicles, might be necessary to confirm the safety of the system. "This is a real detective job," he said, "and one which will be difficult."

The leak found Tuesday was of the same order of magnitude as that discovered following the Dec. 17 test, he added.

George Hardy, a representative of the Marshall Space Flight Center, said that beyond the hydrogen leak, the performance of the engines themselves was good in the second firing.

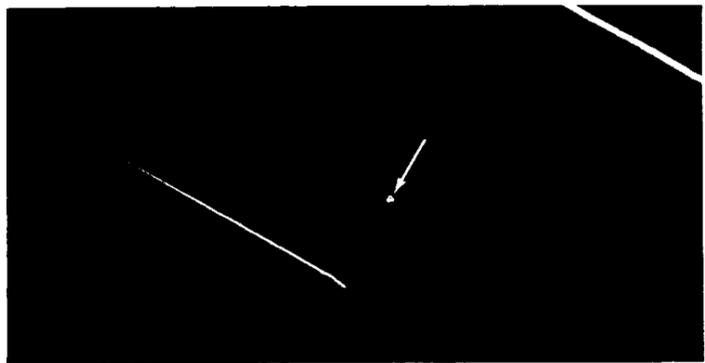
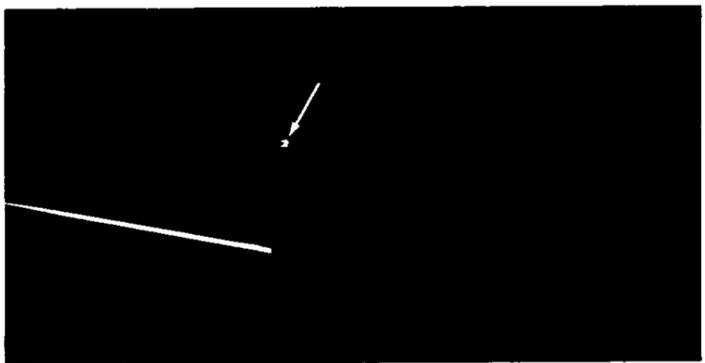
Abrahamson said a number of options exist which could keep the remainder of 1983's flights on schedule. "There is a lot of flexibility in that schedule," he said. Officials have considered pulling the main engines from *Columbia* and installing them in *Challenger*, but that would be a last resort because it would force a change in mission plans for STS-6, causing a shift to minimum weight and minimum mission configurations.

He said it might also be necessary to pull an engine or engines at the pad and either repair them at the Cape or ship them back to the National Space Technology Laboratories for tests, repairs and certification.

Some have also suggested that the roles of flights seven and eight be reversed, in order to assure that both Tracking and Data Relay Satellites are functioning in orbit for the Spacelab mission on STS-9. But Abrahamson expressed an unwillingness to do this, saying that the two satellite customers on STS-7 have schedules which are important to meet. He also said officials working with TDRSS would like to see how the first satellite to be launched on STS-6 operates before sending the second into orbit.

In the meantime, simulations for both the first TDRS deploy on STS-6 and the extravehicular activity scheduled for that mission are continuing at JSC.

On station



Two examples of JSC's latest outer space handiwork — the successfully deployed satellites belonging to Telesat and Satellite Business Systems — are shown here on station in these telescope views taken from Houston not long after their launch on STS-5. Paul Maley of Ford Aerospace captured these views of Anik C (top) and SBS-3 on Dec. 18 using a 2000mm f1 lens on a Celestron 8 telescope. The streaks in the photos are stars trailing through the field of view as Earth and the camera rotated. The Anik exposure was eight minutes and the SBS exposure was about 10 minutes, Maley said. For those of you with an interest in taking the long view of either satellite, look for Anik at an altitude of 55° and an azimuth of 177°, at a slant range of 22,819 statute miles from Houston. Look for SBS-3 at an altitude of 48° and an azimuth of 219°, at a slant range of 23,133 statute miles.

Piland retires after 35 years

Robert O. Piland, manager of JSC's Space Station Office and a 35-year veteran of U.S. Government service, is retiring today after a career in aeronautical and space research that goes back to 1947.

Clarke Covington, in charge of the Space Station Engineering and Operations group, has been named acting manager of the Space Station Office.

Piland's entire career has been with the federal government, in positions with the National Advisory Committee for Aeronautics (NACA), NASA and a one-year assignment as technical assistant to Dr. James R. Killian, President Dwight D. Eisenhower's science advisor.

Piland began his career as an aeronautical research scientist at the NACA Langley Memorial Aeronautical Laboratory (now the Langley Research Center) in Hampton, VA in 1947. He was named Assistant Chief of the Flight Systems Division, Space Task Group, in 1959, and from 1960 to 1965 was Deputy Manager of the Apollo Program.

From 1965 through 1967, he managed the Experiments Program Office and was Deputy Director of the Science and Applications Directorate. In 1970, he organized the JSC Earth Resources Laboratory at the Mississippi Test Facility and served as its Director until 1974.

He later served as technical assistant to the Center Director,

Director of Space and Life Sciences, and was Director of Engineering and Development before his current assignment as Manager of the Space Station Office.

Special honors and awards in his career include the NASA Outstanding Leadership Medal, the NASA Exceptional Service Medal, the JSC Apollo Achievement Award and the Lawrence Sperry Award. Piland is married to the former Myra Stanton. They have three children, James, Thomas, and Elizabeth.

For more on Piland's career and his views on aeronautics and space exploration, see the interview in the next issue of the **Roundup**.

Bulletin Board

Hooks to speak at Feb. 18 observance

Dr. Benjamin L. Hooks, Executive Director of the National Association for the Advancement of Colored People (NAACP), will be the keynote speaker at the JSC program commemorating the 57th annual observance of the contributions Black Americans have made to life and culture in the United States. The theme of the program, which commemorates Black History Month in February, is "The U.S. Constitution and the Black American." Hooks' speech will explore that topic beginning at 1 p.m. Feb. 18 in the Bldg. 2 auditorium. The idea of recognizing the accomplishments of Black Americans was initiated in 1926 by Dr. Carter G. Woodson and is now observed nationwide during February.

AIAA meet to feature STS-5 crew

The Houston Section of the American Institute of Aeronautics and Astronautics will sponsor an after work reception Feb. 10 to honor the crew of STS-5 and all members of the Shuttle team who contributed to the success of this historic mission. The reception will be held from 4:30 to 6:30 p.m. in the Gilruth Recreation Center. The cost to members and spouses is \$6, \$7 to non-members and a \$2 discount for students. For reservations, call Pat at Martin Marietta, 333-4150; Joanne at Rockwell, 333-2030, x242; Nancy at NASA, x3995; or Patty at McDonnell Douglas, 488-5660, x211.

Volunteers sought for computer study

When *Time* Magazine labeled the computer as 1982's "Machine of the Year," one of the principal reasons was for its effect on the American way of life. Now researchers at the University of Houston Central and Clear Lake campuses are seeking volunteers for a study which is among the first to try and quantify just what that effect is. Funded through U of H by the Hogg Foundation for Mental Health, the survey will explore the impact of computers in the home: how they influence interactions between individuals and how their presence may have changed daily life. The study needs 100 families or couples (more than one user in a home is required to gauge interactions) for a one to two-month survey of their user habits. Participants will use a diskette provided by the survey sponsors to record at home various types of information which should identify what kind of effect the computers have. All information will be held in strict confidence, and participants will be provided with a copy of the findings when the survey is completed, probably by the end of this year. An initial questionnaire and the diskette will be mailed to or dropped off at participants' homes. For more information on the study, contact Jennifer Jarratt at 474-7534, or Box 565 in Seabrook, 77586. Principal investigators are Prof. Christopher Dede, a futurist at UHCLC, and Dr. David Gottlieb, a sociologist at the U of H Central campus.

Space station workshop set

Experts from around the Agency and the aerospace industry will meet in Williamsburg, VA March 28 to 31 to assess the past and future progress toward NASA's goal of developing a space station by the next decade. Organized around the study areas of NASA's Space Station Technology Steering Committee, the conference will cover such topics as data management, communications, crew and life support, structures and mechanisms, auxiliary propulsion and human capabilities. The conference is being held at the National Conference Center in Williamsburg. For more information, contact Ann Suit at the Langley Research Center, FTS 928-3341.

NASTRAN colloquium scheduled

The 11th NASTRAN (NASA Structural Analysis Program) Users' Colloquium will be held May 2 to 6 in San Francisco. Sponsored by NASA and the Computer Software Management and Information Center (COSMIC) at the University of Georgia, the colloquium will explore various functions of the NASTRAN system, including a new hidden line capability and other enhancements. The first two days are scheduled to cover introductory and intermediate explorations of static analysis, plotting, substructuring, thermal analysis and other NASTRAN capabilities. The third day will be a question and answer session as well as a workshop on NASTRAN enhancements. The last two days will be devoted to contributed papers on NASTRAN. Participants may register for selected days or all days, depending on need. For more information, contact COSMIC, 112 Barrow Hall, University of Georgia, Athens, GA 30602, or call (404) 542-3265.

Golf Association starts season soon

The 1983 JSC Golf Association season starts in March, and "everything looks great for a full year of fame, glory and prizes," according to President Bill Shropshire. All prospective members with an established or guesstimated handicap of 1 to 16 should contact Jerry Shinkle, x2201. Those with handicaps somewhere between 17 and the Moon, Shropshire says, should contact John Trebes at x2068. The new officers for 1983 are Treasurer Bob Sampson, Handicap Chairman Jerry Pels, Group 1 Director Jerry Shinkle, Group 2 Director John Trebes and President Bill Shropshire.

Gem and mineral show scheduled

The Clear Lake Gem and Mineral Society will present its 8th annual show Feb. 5 and 6 at the Civic Center, 400 W. Walker in League City, from 9 a.m. to 9 p.m. on Saturday and from 10 a.m. to 6 p.m. on Sunday. Admission is \$2 for adults and 50 cents for children. For more information, call D. Mack Robinson at x2307 or 534-4696.

Credit Union seeks nominees for March 3 elections

The nominating committee of the JSC Federal Credit Union is looking for members in good standing interested in serving on any of five board and two credit committee positions to be filled in an election March 3. Members of the Board of Directors participate in such important decisions as setting dividend levels, establishing loan policies, authorizing investments of credit union funds and overseeing general operations of the credit union. Members of the credit (loan) committee participate in the review/approval/disapproval of loan applications. If you are interested in serving in either capacity, please call one of the following nominating committee members: Peggy Zahler, x3901; Edward H. Stokes, 333-2030; or Tom Krenek, x2231.



Some 62 of the Systems Engineering Division's 87 personnel were out and ready for the last Intercenter Run at the Gilruth Center recently, and 27 of them went on to participate in the 10-kilometer run as well. This earned the division 89 (25.8%) of the 345 participation points recorded by JSC. In recognition of that achievement, Helen Munk, Assistant Recreation Director, is shown here presenting the Large Division Participation Trophy to Paul Romere, run coordinator for the Division, as race participants from the Division look on. SED has won four of the last five participation awards and is planning to do it again in April, Romere said.

Thirty-nine employees were honored recently for their length of service to the U.S. Government and NASA. The employees, and their length of service, are: Austin W. Frost, 35 years; John F. Flynn, 30 years; James F. Axley, 25 years; Roy W. Collins, 25 years; Tallulah T. Monroe, 25 years; Harold E. Granger, 25 years; Joseph E. Mechelay, 25 years; Marvin F. Matthews, 25 years; Norman F. Eubanks, 25 years; Elton A. Wilborn, 35 years; Peter P. Smetek Sr., 40 years; Eugene F. Kranz, 25 years; Vincent A. Alvarez, 30 years; James B. McCaulley, 25 years; Charles D. Anderson, 25 years; Charles F. Hayes, 25 years; Donald J. Bourque, 25 years; Willis M. Bolt, 25 years; Frank H. Samonski Jr., 25 years; Robert A. Tremant, 30 years;

People

M. Meredith Frasher, 35 years; Thomas D. Jeffcoat, 25 years; Jerrold H. Sudath, 25 years; Albert C. Copeland Jr., 25 years; Ralph E. Drexel, 25 years; Robert L. Giesecke, 25 years; Donald R. Smith, 25 years; William A. Chandler, 25 years; Walter M. West Jr., 25 years; Fred S. Japp, 25 years; Charles D. Rudd, 30 years; Robert E. Ernull, 25 years; Ellis B. Guess, 40 years; LaMarr

D. Beatty, 30 years; J. D. Higginbotham, 25 years; Walter R. Wilson, 25 years; Charles E. Chunn, 30 years; Jesse F. Goree Jr., 25 years; and Robert A. Newlander, 25 years.

Dr. Maxime A. Faget, Director of Engineering and Development here from 1961 to 1981 and an original member of the Space Task Group, has been chosen one of three Outstanding Inventors of 1982 by the Houston Patent Law Association. Faget, who was intimately involved with every spacecraft from Mercury to the Shuttle, was honored for his work in space vehicle systems. Other winners were **Dr. Charles Homsy** in medicine and **Robert B. Kinzbach** in oil tools and drilling technology. Faget is the recipient of 21 major awards in his career, and holds six patents which include: Patent No. 3,001,739, the escape tower used in Project Mercury and later in Gemini, Apollo and Skylab; Patent No. 3,038,175, the Project Mercury capsule; and Patent No. 3,702,688, the Space Shuttle System. Faget is now Vice President of New Program Development for Eagle Engineering Corp. in Clear Lake City.

JSC has been awarded the Texas A & M Outstanding Cooperative Education Employer Award for superlative performance in five different categories. JSC hires more co-ops from A & M than any other school. The Center was recognized for the quality of its co-op work assignments, the quantity of co-op students employed, for multi-disciplinary co-op job development, the administration of the program and for participation in cooperative education activities beyond the traditional student-employer relationship. The award was accepted by JSC Director **Gerald Griffin**, Co-op Coordinator **John Duncan**, Training Officer **Stan Goldstein** and Personnel Officer **Jack Lister**. About 15% of JSC's complement of co-op students are usually from A & M, and last year 15 of 99 new hires were Aggies. A & M students work in E & D, FOD, DSAD, Administration, SR & QA and Personnel. Agency-wide, cooperative education students comprise NASA's principal source of new blood, and the co-op programs at each of the Centers are considered among the most important personnel programs.



Joe Schmitt (second from right), the man in charge of suiting astronauts up for practically the entire U.S. manned spaceflight program, was honored Jan. 6 with a retirement party at the Kings Inn. Among those attending were (left to right) astronauts **Gordon Cooper**, **Alan Shepard**, **Vance Brand** and **William Anders**.



Texas A & M's Outstanding Cooperative Education Employer Award is accepted by JSC Co-op Coordinator **John Duncan**, left, and JSC Director **Gerald Griffin**. Presenting the award is Aggie Co-op Director **Steve Yates**.

For Chaney, listening was the Key

From the beginning, it has been a prodigious undertaking.

Out of what was once a cow pasture, one of the world's most sophisticated space centers was literally carved from scratch, and when all of the planning and site renovation and building was done, there was still the job of sending men into space.

In looking back on that achievement of mammoth construction going hand in hand with the development and operation of spaceflight programs, Bailey Chaney credits the simple acts of listening and cooperating as going a long way toward assuring a smooth relationship with the unions, companies and people who actually built JSC.

Chaney, the Labor Relations Officer here for more than 20 years, retired in early January after 34 years of government service. In that time, there have been disputes with the organizations

who supply skilled labor to JSC, but no problem has ever gone to court, and Chaney said most of them could be solved by simply listening and working the disagreements out.

"The key to dealing with organized labor in this area," he said, "has been to keep in contact, to let them know who we are and what our needs are. We might go down to the Building Trades hall, for example, and explain that we had a job coming up which would require 200 electricians and ask their help in recruiting people to fill a contract of that size. By and large, they have been very cooperative. They understand our appreciation of what's been done. Over the years, we've had our strikes, we've had our differences, but in most cases those we have had have been a failure of the various parties to get together and communicate."

Chaney believes the implementation of a one-gate concept

governing picket lines has, with National Labor Relations Board approval, made it possible to keep the center operating while also observing the right of unions to erect picket lines. Under this process, the Labor Relations Officer designates which one of JSC's five gates may be picketed.

He also said the stability of working with the government has made it possible to retain many highly skilled craftsmen and tradesmen who might otherwise have gone on to other jobs. "I think it has been a good assignment for these people," he said. "Some of them have been here for many years, and their knowledge of equipment and facilities helps us solve our problems."

Looking back, Chaney couldn't have asked for a better assignment. "Being able to associate with a program as stupendous as this and with the people who make it go has never stopped being rewarding," he said.

Thoughts on living in Space

James T. Visentine and Jeri W. Brown

Crew Station Branch, Experiments and Operations Support Division

Habitability will be important to design of future space station

In the next few years, one of the major study areas in the business of manned spaceflight will center on the utility of a space station. The overall objective of these studies is to define a space station program so that, when the time comes, the Administration and Congress can make an informed decision on whether the U.S. should commit to a space station as the next major initiative in space.

As of now, a Space Station Task Force has been formed and a Technology Steering Committee has been activated. Various supporting activities have begun at the field centers, and a mission requirements study is underway among several major aerospace companies, with findings due in April. By 1986, NASA plans to have the concept fully defined, with mission requirements well understood. The Agency will have completed a project plan, a development and fabrication plan, a test and operations plan, a management plan and an acquisition plan. The industry teams to help construct the station will have been selected. Beyond that, all that will remain is a decision to put the technology teams in place and start bending metal.

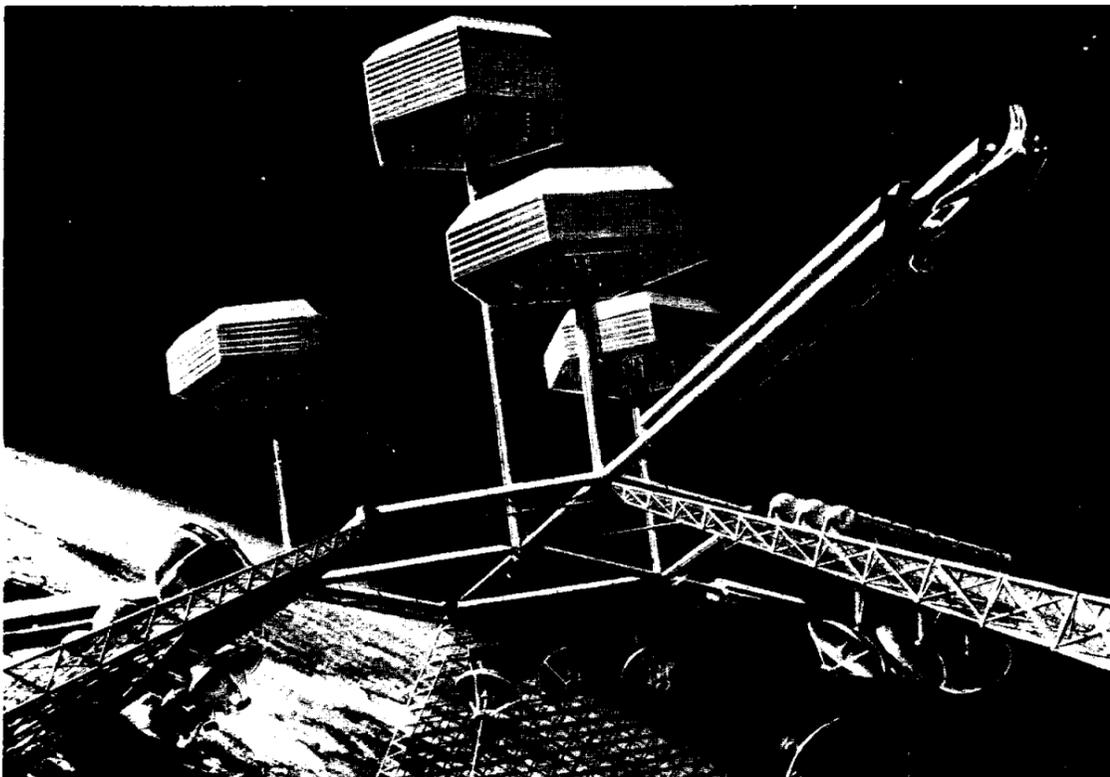
One primary consideration in a project of this scale is how well humans will fit into it, and that comes down to one word — habitability. Some thoughts on this all important consideration are presented here by Jim Visentine, a JSC aerospace engineer and a member of the University of Houston space station design concept team, and Jeri W. Brown, who worked on crew station designs for both Skylab and the Space Shuttle.

Whether we are at home, in the office or elsewhere, each of us interacts with our surroundings, the environment, the people therein and the things provided to support our daily activities. These interactions are often at a very conscious level, but sometimes, we are unaware of the effects our surroundings have on us and our behavior.

The quality of life we perceive as a sum total of our surroundings can be referred to as "habitability." Perceptions of habitability vary among individuals, however. A dry, summer day in Houston could be called unbearably humid by a visitor from Arizona — not everyone likes artichokes or chicken livers, and our individual recreational preferences can include reading, tinkering with old cars, playing volleyball or bridge, or a myriad of other choices.

In space, these many choices are usually not present. There are no old cars to tinker with, and sports such as volleyball, even if there were room enough to play, become totally different experiences in the absence of gravity.

Habitability, therefore, becomes much more of an issue for space operations than for activities on Earth. In the hostile space environment, space crews are to a large degree isolated and confined. The micro-gravity state not only effects changes in human physiology, but also presents unique conditions under which



This Lockheed concept shows a major space facility in orbit around the year 2000. In large measure, the habitability of such a facility, the ease of living on board, will be based on decisions made this decade. (Courtesy Lockheed Missiles & Space Co.)

various crew activities must be performed.

These conditions may be advantageous or disadvantageous, depending on the activity. Large-mass objects can be moved with minimal effort in space, for example, but small unrestrained items can easily float away and become lost. Clothing pockets become valuable, portable stowage places for a wide variety of items, including snacks, fasteners and tools. A quick shower on Earth becomes a "bird bath" in orbit with water particles floating randomly in all directions. And while soaping up "up there" is relatively easy, rinsing off is tedious and time consuming.

A special shower designed to simulate Earth's gravity using air flow so that water will "drain" more closely approximates what the crewman is used to at home. The shower might require wiping and stowing after its use, depending on how volume within the vehicle has been allocated. Meal tables in a space station are not essential since the crewman can eat while in a weightless free-float condition. Earth-style chairs are an imposition in space because the human body simply does not conform to that outline in weightlessness. Even tying one's shoelaces requires an extra effort to hold one's foot in place.

At this stage in its space program, the United States has the opportunity to build a space station which could lead to a permanent presence in space. The potential of such a space station is well known, and even now NASA and several aerospace contractors are developing requirements, possible applications and developmental plans should the nation decide to build such a facility. The true utility of a space station, however, will be derived by how well its crew members can work and live in space and how they can learn to deal with periods of prolonged isolation and con-

finement in an unfamiliar, inhospitable environment. In dealing with these issues, habitability becomes a central concern.

Lessons from the past

Skylab, America's first space station, provided an excellent opportunity to determine how well nine different people could live and work in space. The three Skylab missions, with durations of 28, 56 and 84 days, provided a wealth of data on habitability and physiological responses to space.

One area of study was to determine how well the astronauts would adjust to the different volumes within the spacecraft, to geometric orientations, and how important their sense of "local vertical" — distinguishing up from down — would be. Interior volumetric size was found to be important. The astronauts reported they felt more at home in the confines of the lower deck of Skylab rather than in the voluminous experiment area of the upper deck. The lower deck consisted of small rooms which enabled the astronauts to feel more enclosed and less likely to lose their sense of local vertical. At the same time, the large open area of the upper deck had its advantages too. There was ample space to exercise and enjoy the benefits of weightlessness. It also acted as a reprieve from the small, enclosed rooms on the lower deck. Depending on the moods of the crew members, or the tasks of the day and the jobs at hand, both larger and smaller areas had their unique advantages.

The geometric orientation of various compartments within the space station was also important. Engineers purposefully designed each compartment within Skylab with a different sense of local vertical to test astronaut reactions to it. The sensation of being uncomfortable with this changing local vertical was reported by all three

crews. One reason may be that each individual seems to carry a concept of what should be up and what should be down. When right and left, up and down become reversed, there is momentary confusion and a need to adjust to it. A common local vertical throughout a space station would therefore be beneficial from the standpoint of habitability.

Researchers also found that tables and chairs on Skylab were inadequate. The wardroom table, which contained the food trays, was designed for a person's normal posture in a gravity environment. In space, an astronaut's height increases due to the absence of gravity, but he assumes a somewhat fetal posture, referred to as the "Neutral G Position." One major task in designing a future space station will be to understand and accommodate these changes in body positions in micro-gravity.

In physiological responses, Skylab also showed us there was a great deal to learn and take into account. Man has been far more capable in the space environment than had been predicted before the Mercury and Gemini programs. The medical problems that have been observed appear to be surmountable.

Before Skylab, the longest duration mission was Gemini 7, which orbited the Earth for 14 days in 1965. After the flight, medical personnel observed several adverse changes in the physical condition of the astronauts. They had lost muscle tissue and some physical strength; they had lost body calcium and bone density. There was evidence of cardiovascular deconditioning, and body fluids had migrated from their legs to their heads and chests. Crewmembers also lost weight, were slightly dehydrated and showed decreased red blood cell mass.

As a result of these bodily changes, Skylab mission planners

decided to extend the flight durations in increments to see if these effects would become progressively worse, or if they would somehow level off and eventually improve. Medical experiments during Skylab showed improvements after a period of adaptation.

After about 30 to 40 days in orbit, crew physical conditions stabilized and, in the case of some, actually began to improve to almost pre-flight levels. Cardiovascular system improvement was noted, and the astronauts appeared to stop losing muscle tissue around the 40th day in orbit. The third crew, in orbit for 84 days, lost the least amount of weight. Their loss of body fluids appeared to stop between the 10th and 14th days. The loss of red blood cells leveled off and after a period of time, members of the third crew began to generate new red blood cells while still in space.

An improved personal exercise program used on the second and third missions may have been responsible for some of these results. Since that time, astronauts and flight planners alike have stressed the importance of maintaining exercise programs even while in space, and this will become an especially important consideration for long term missions on any future space station.

Looking to the future

One of the great joys of spaceflight, many who have been there say, is looking out the window to view the heavens and see where you have been. In Skylab, one of the principal forms of relaxation centered on a large viewport in the lower deck, where crew members could sit and gaze at the Earth or space and enjoy their surroundings. So far in the Shuttle program, one of the most repeated comments from the 12 people who have flown is the enjoyment they derived from the large and plentiful windows on the Orbiter.

While configuring a space station with a great many windows is not an answer in itself to habitability considerations, there is a point to be found here. In designing a space station for many years of habitation, planners will need to incorporate features which tend to emphasize the advantages and enhance the enjoyment of living and working in space. Having the freedom to watch the Earth float by is one of these, and so is the ability to live life in a way that at least approximates life on this planet.

This might include everything from walls with color and texture to a laundromat capable of functioning in micro-gravity on future space stations. It could include private quarters, an exercise facility, an off-duty lounge equipped with televisions and sound equipment, specialized work stations, laboratories and an autonomous command and control center.

The degree to which humans can work and live in space is strongly influenced by these factors. A space station which is adequately designed will provide sufficient room for all work and leisure activities and an environment to minimize boredom and reduce tension between persons living in close quarters. The health, safety and morale of crewmembers aboard future space stations, factors which are strongly influenced by habitability, take on added significance when we realize how strongly they influence productivity and eventual mission success.

SPACEFLIGHT
THE FIRST QUARTER CENTURY AND BEYOND

Gilruth Center News

Call x3594 for more information

Races — The next Rec Center Fun Run is Feb. 26, with an 8-mile and a 1-mile race. The cost is \$2, and the first race begins at 9 a.m.

Tennis lessons — These classes are designed for the person who has never had lessons or for those who desire to refine a particular aspect of their game. Beginning tennis is on Tuesdays, from 5:15 to 6:45 p.m., starting Feb. 8 for eight weeks. Intermediate tennis will be held on Wednesdays from 5:15 to 6:45 p.m. beginning Feb. 9 for eight weeks. Each class will cost \$26 per person.

Ladies weight training — This popular class begins Jan. 31 and runs for six weeks. Class meets Mondays and Wednesdays from 7 to 8 p.m. The cost is \$20 per person.

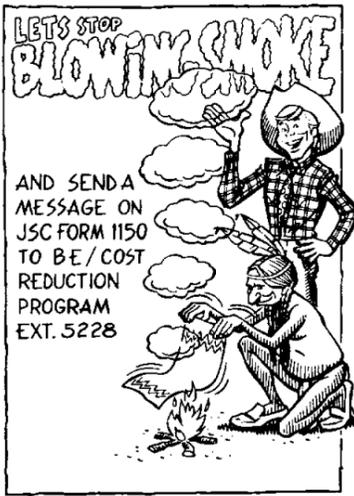
Principles of decorating — This class is designed to help you think about how to decorate your home. Basic patterns and ideas will be discussed, as well as ways in which to accomplish the decorations. Class begins Feb. 3 and runs for eight weeks. The cost for this Thursday night class is \$30 per person. The sessions run from 7 to 8 p.m.

Ladies self-defense — Learn the basic skills of self-defense by signing up for this two-week course. Class runs from 9 a.m. to noon on two successive Saturdays, Feb. 19 and 26. The cost is \$30 per person.

Space News Briefs

Spacelab 1 experiments installed

Work leading toward the first launch of Spacelab in October entered a new phase of integration earlier this month with the successful Mission Sequence Test verifying compatibility of recently installed experiments in the lab's habitable module. During the Level IV integration, all Spacelab experiments were brought together from various parts of the world and assembled into a complete payload. Experiments requiring direct exposure to space were installed on the Spacelab pallet, while other experiments were installed in racks which will be attached to the floor of the laboratory itself in the current phase of integration, known as Level III/II. The pallet and its experiments will be moved into position aft of the module and the entire payload checked again using actual Spacelab flight subsystems as the steps toward launch continue. After completion of this phase, Spacelab will be installed in the payload bay of *Columbia* around mid-August for the STS-9 mission.



Week of January 31 - February 4, 1983

Monday: Cream of Celery Soup; Braised Beef Ribs, Chicken a la King, Enchiladas w/Chili, Italian Cutlet (Special); Navy Beans, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Beef & Barley Soup; Turkey & Dressing, Country Style Steak, Beef Ravioli, Stuffed Cabbage (Special); Corn Coblette, Okra & Tomatoes, French Beans.

Wednesday: Seafood Gumbo; Catfish w/Hush Puppies, Roast Pork w/Dressing, Chinese Pepper Steak (Special); Broccoli, Macaroni &

Viking

(Continued from page 1)

What we saw was a sizeable temperature drop." That temperature drop, coupled with the last Viking surface images and with recent Earth-based observations, indicate a very severe dust storm is underway on Mars, greater than the large storm observed in 1977. Gianopulos said it is "highly unlikely" that the dust storm had anything to do with Viking's problems.

The third factor increasing the level of disappointment is that the Viking team was gearing up for

new science projects. "The idea was, if you've got a live spacecraft on Mars, why not invite people to make use of it? We were able to get some additional funding from Headquarters, and were going to invite people to submit ideas for live science on the surface."

Whether or not those experiments will take place depends in large measure on the success of the communications attempt Feb. 1. "If we are not successful," he said, "if it is not the battery and not the antenna, then it could be most anything you can think of."

Cookin' in the Cafeteria

Week of January 31 - February 4, 1983

Monday: Cream of Celery Soup; Braised Beef Ribs, Chicken a la King, Enchiladas w/Chili, Italian Cutlet (Special); Navy Beans, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Beef & Barley Soup; Turkey & Dressing, Country Style Steak, Beef Ravioli, Stuffed Cabbage (Special); Corn Coblette, Okra & Tomatoes, French Beans.

Wednesday: Seafood Gumbo; Catfish w/Hush Puppies, Roast Pork w/Dressing, Chinese Pepper Steak (Special); Broccoli, Macaroni &

Cheese, Stewed Tomatoes.

Thursday: Cream of Tomato Soup; Beef Tacos, BBQ Ham Slice, Hungarian Goulash, Chicken Fried Steak (Special); Spinach, Pinto Beans, Beets, Whipped Potatoes.

Friday: Seafood Gumbo; Liver & Onions, Deviled Crabs, Roast Beef w/Dressing, Tuna & Noodle Casserole (Special); Peas, Whipped Potatoes, Cauliflower.

Week of February 7 - 11, 1983

Monday: French Onion Soup; Beef Chop Suey, Polish Sausage w/German Potato Salad, Breaded Veal Cutlet (Special); Okra & Tomatoes, Green Peas. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads,

Sandwiches and Pies.

Tuesday: Split Pea Soup; Salisbury Steak, Shrimp Creole, Fried Chicken (Special); Mixed Vegetables, Beets, Whipped Potatoes.

Wednesday: Seafood Gumbo; Fried Catfish w/Hush puppies, Braised Beef Rib, BBQ Plate, Weiners & Beans, Shrimp Salad, Stuffed Bell Pepper (Special); Corn O'Brian, Rice, Italian Green Beans.

Thursday: Chicken Noodle Soup; Beef Stroganoff, Turkey & Dressing, BBQ Smoked Link (Special); Lima Beans, Buttered Squash, Spanish Rice.

Friday: Seafood Gumbo; Broiled Turbot, Liver & Onions, Fried Shrimp, Meat Sauce & Spaghetti (Special); Green Beans, Buttered Broccoli, Whipped Potatoes.

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP 3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

10 acres for lease, Alvin area. Call L. Damewood, 482-5572.

For rent: Clear Lake Shores 2 BR brick house, close to water, \$395/mo. plus deposit. Call 334-5164 after 4:30 p.m.

Royal Aloha Tahoe condo, sleeps 6, completely furnished, 150 yards from ski lift, four miles from casinos, \$500/wk. Call 488-8682.

Co-op special: furnished bedroom in private home, \$155/mo. plus options, utilities paid, available now. Call Jim, x5071 or 480-5097 after 5 p.m.

For sale: Lake Livingston area, 2 BR house on 30 acres, deep well, wooded, fenced, live creek, \$95K. Call 488-4915.

For sale: Middlebrook 4-2-2, formals, paneled den, bookcases and fireplace, energy efficient, low equity, 9.5% VA loan, 2,150 sq. ft. Cal. Wheeler, x5276 or 486-5346.

For lease: Baywind II condo, 1 BR, fireplace, W/D conn., near adult pool, tennis, exercise room. Call Briley, x2831 or 488-7901 after 5 p.m.

For sale: League City 3-1.5-2, new carpet and vinyl, \$55K, approx. move-in \$2,200, with \$655/mo., 12% interest, 609 Reynolds. Call 554-6200.

For lease: super bargain, Bacliff new renovated 2-story house, W/D, \$425/mo. plus deposit. Call Slezak, x2662 or 481-5659.

Lease/purchase: Woodmeadow, Scarsdale 3-2-2A split contemp., hi eff. AC, R-30 ceiling, fence, cul-de-sac, built 1978, \$540/mo., \$66,500. Avail. immediately, references. Call 868-7307 or Mitchell, x4941.

For sale: Countryside 3-2-2, assume non-escalating 11.5% VA, low equity, no qualifying, ceiling fan, 800' deck, garage door opener, \$640/mo. Call Johnson, 322-6616 or 488-5010.

For sale: One, two or three 50' X 100' logs on Crystal Beach at Bolivar/Galveston. Call 921-7212.

For sale: 1 BR condo on El Dorado, low equity, non-escalating 11% loan, includes washer, dryer and ceiling fan. Call Bassett, x4770 or 480-8021.

For rent: Glen Cove/League City 2-1.5, carpet, oven, dishwasher, disposal, refrig., center air/heat, storage, Clear Lake 1/2 block, \$450/mo. Call Brown x3541 or 334-5244 after 6 p.m.

For lease: Forest Bend townhouse, 2-2-2, patio, pool, \$395. Avail. March 1. Call 486-0462 after 6 p.m.

For sale: 3-2 in Edgebrook, studio, den, gameroom, 1,850 sq. ft., 8.5% VA loan, off I-45. Call Dennis, x5281 or 334-5757.

For rent: 3-2-1 energy efficient home, fenced, Forest Bend, \$495/mo. plus deposit and references, avail. March 1. Call 334-5792.

Cars & Trucks

1980 Triumph Spitfire 1500, convertible, green, AM/FM, plus hardtop,

15K miles, \$5,000. Call Bill Veach, x6226 or 996-0122.

1978 Pontiac wagon, 9 passenger, AC, PS, PB, AM/BM, cruise, \$3,200. Call N. R. Gonzalez, x4007 or 534-2720.

1976 Chrysler Cordoba, excellent condition, auto, AC, AM/FM, cruise, tilt, like new, 57K miles, \$1,995. Call 488-4788 after 7 p.m.

1979 Ford Pickup, F-100, like new, AC, AM/FM/8-track, new radials, std. trans., 30K miles, \$5,000. Call 332-9041 or 332-1127.

1975 Toyota Celica, AC, AM/FM, 5-spd., mechanically good, body needs TLC, dependable transport, \$1,200. Call Thompson, 332-2229.

1970 Plymouth Duster, 3-spd., slant 6 engine, only 69K miles, single owner, excellent condition, \$750. Call Robert, x5217 or 480-3944.

1966 Ford Mustang, 6 cyl., 3-spd., 2/3 restored, \$2,750. Call Pete, x5021 or 334-2756.

1980 Mercury Capri, 3.3 liter, power and tilt, cruise, auto, 27K miles, AC, AM/FM, silver, \$4,650 or best offer. Call 481-0641 or 280-4548.

1979 Olds Delta 88, power and tilt, cruise, auto, AC, 4 new tires, AM/FM, red, \$4,250 or best offer. Call 481-0641 or 280-4548.

1976 Datsun B210 2-door, 4 cyl., 4-spd., great MPG, radio, AC, \$1,500. Call 334-1286 after 5:30 p.m.

1974 BMW 2U02, 2 door, auto, air, AM/FM/cassette, mechanically sound, needs some body repair, \$3,200. Call Vickie, 482-7675 after 6 p.m.

1980 Olds Omega, 6 cyl., AC, vinyl roof, sunroof, cruise, AM/FM, 34K miles, \$4,500. Call Norris, x5496 or 488-2276.

1970 Olds Cutlass; 1979 Dodge Power Wagon; Jeep Cj7 top and doors. Call Bruce, 644-4429.

1981 Camaro, V8, T-tops, rear defogger, cruise, tilt, rally wheels, extras, 14K miles, immaculate. Call 488-2269 after 4:15 p.m.

1976 Dodge Surveyor van conversion, 22K miles, AC, power, \$5,000 or best offer. Call Cliff, 795-4411, x3561 or 485-8208 after 6 p.m.

1975 Ford Granada, 4 dr., power, air, 58K miles, good condition, \$1,800. Call 480-8057 after 5 p.m.

1978 Chevy Caprice Classic, loaded, clean, original owner, service manuals, 68K miles, \$2,795. Call 486-0462 after 6 p.m.

Cycles

650cc Kawasaki, 10K miles, immaculate, \$1,195; 3-bike trailer, \$250. Call Dennis, x5281 or 334-5757.

1980 Suzuki 100, low miles, good condition, must sell. Call M. Corley, x3976 or 488-3011 after 5 p.m.

BMX bike, competition equipped, never raced, \$145. Call 482-9172 after 5:30 p.m.

Boats & Planes

Boeing Stearman for rent, two place, aerobatic, \$80/hr. Wet. Call Alan Fox, x5348 or 480-8393 after 5 p.m.

V-bow, 10', 2 pontoon inflatable heavy gauge rubber boat with wood deck and transom for up to 25 hp, ideal for lifeboat, diving, hunting, etc. Call B. Reina, 488-1326 after 5 p.m.

1982 16' Sterling speed boat with custom trailer and 115 hp Mercury engine, six months left on warranty, excellent condition and loaded. Call Chuck or Jeff, 998-9086 after 5 p.m.

FAA Pilot ground school, \$10 through Gulf Coast Aero Club. \$8/mo dues. Call Mark, x4436 or 554-2538.

Deluxe 5 hp outboard motor, excellent condition, \$195. Call 488-4487.

1979 Sea Ray, 22', inboard/outboard, fully equipped, perfect condition, tandem wheel trailer included. Call 479-8141.

Buccaneer 24' cabin sailer, sleeps 6, main cabin, galley, head and extras. Call 996-9070 after 5 p.m.

Household

RCA 25" color console TV, wood cabinet; Lazy Boy rocker; king size bed w/Victorian headboard; marble chess set. Call Bruce, 644-4429.

Three-piece sectional living room set, good condition, \$100. Call 488-8682.

Guest room furniture, "Foley's Best," mattress and box springs with queen/double frame, head and footboard, dresser, mirror. Call 334-4894.

Kenmore washing machine in good condition. Call 471-0262 after 6 p.m.

Couch and matching chair, \$80. Call 480-7200.

Antique oak roll top desk, matching leather chair with oak trim, 13 pigeon holes, ca. 1850, \$900 negotiable. Call Verna, x2471.

King size mattress, \$25; electric Kenmore dryer, like new. Call Haines, x3851.

Corner unit day bed, brown/gold plaid covers, new mattresses, excellent condition, \$240. Call Brenda, x3836 or 996-9738 after 4:30 p.m.

GE 21" B & W TV, console, Danish modern style, 20 years old and still works. Call Malcolm, x5879 or 471-3303.

Tappan countertop range, hood and built-in oven (gas), coppertone, excellent for camp or rent house, \$150. Call 488-4117.

Four black vinyl chairs, table, \$50; 2 lamps, \$10 each; rust swivel rocker, \$25. Call 482-3540 after 6 p.m.

Couch and chair, new, never used, velvet print, \$250; dinette table and 4 beige chairs, \$150; double bed, \$150. Call Jan, x2681.

Sears 12" B & W TV, works well, \$40, AM/FM stereo record player, \$50. Call Mark, x4436 or 554-2538 after 6 p.m.

Heathkit 25" TV, GR 900 w/o cabinet, \$75. Call Tex Ward, 488-5445.

Three-piece sectional living room set, good condition, \$100. Call 488-8682.

Wrought iron round table, glass top, 4 chairs, \$150. Call 488-8682.

Sears 18.2 cu. ft. freezer, w/auto defrost, good condition, \$75. Call Jack, x6301.

Dinet set, woodgrain formica, four chairs, black wrought iron w/wood trim, black seats, 12" extension, \$75. Call Beth, x4311 or 554-2908 after 6 p.m.

Wanted

Want small, clean low mileage used car. Call Dave, x6361 or 474-3401 after 6 p.m.

Want to join carpool from Kingwood/Humble (FM 1960 and Hwy. 59) area to Agena Bldg. on Bay Area. Call Abdul, 488-9005.

Want 1 person with car to join carpool from Bellaire/Buffalo Spdw. area to NASA 8 a.m. to 5 p.m. shift. Call Margaret or Peter, x4231.

Will buy silver dollars, pay \$12 and up based on condition. Call 482-7698 after 5 p.m.

Want flute. Call Mary, x7272 or 944-8201 after 5 p.m.

Want disk drive w/o controller for Apple II computer. Call Ken, x2065 or 473-2602 after 5:30 p.m.

Pets & Livestock

Springer Spaniel puppies, AKC registered, liver & white, born Dec. 31, four males, five females, \$150. Call 334-4352 after 4:30 p.m.

AQHA four year filly, excellent confirmation, show quality, grand daughter of "Impressive," has reigned and cut experienced rider, \$6,000. Call Gina, x2025.

English Pointer pups, dark liver & white, excellent hunters, ready now, \$50. Call McElya, x3661 or 482-1542.

Pair of young healthy parrots, beginning to talk, need faithful coaching while they are young, \$200. Call 485-3521.

Musical Instruments

Electric piano/harpsichord/lute/organ with or without amplifier, make offer. Call 334-4894.

King comet, brass, almost new, \$150. Call Tony, x2241 or 471-3025.

Baldwin/Acronsonic piano, cherry with bench in excellent shape, about 20 years old, \$1,000. Call Holley, x3066.

Miscellaneous

Nikon EM camera, 50E 1.8 lens, SBE flash, MBE motor winder, all in perfect condition, \$195. Call 488-0426.

Slide Dupliscopes, Spiratone, for 35 mm camera, for 2 X 2 slide duplication, \$10; Bosch fog lights w/covers, 1 yr. old, originally \$75, sell for \$35. Call Leona, x3338.

8" shopmaster table saw, aluminum table, good condition, \$85. Call 488-4487.

Four R205 X H Goodyear radials, 20,000 miles left, \$20 each. Call Dennis, x5281 or 334-5757.

DSI frequency counter, 50 hz to 600 Mhz, model 3600A, \$165; RCA voltahmst VTVM, HV \$65; 6VDC-15 amp charger, \$15. Call 921-7212.

For sale: Scott catalogs for postage stamps, select from 1963 to 1982, \$5 up. Call Jeff, x7429.

New, never used set of Time/Life Do-It-Yourself books, 16 vol. set, cost \$130, sell for \$50. Call Frank, x3836 or x3837.

Minolta flash, 132X, dedicated, 2 auto settings, bounce, leather case, like new, \$25. Call Wheeler, x5276 or 486-5346.

Golf clubs and bag, \$150; pool table light, \$95; beer can collection, \$75; two telephones, \$30; sterling silver medallions, 1977 Franklin mint set of 25 (Gemini 5 through ASTP) in display case, make offer. Call Pete, x5021 or 334-2756.

Mattel Intellivision system in excellent condition, including 10 game packages and manuals, \$450 or best offer. Call Steve, x4395.

Ten piece trap set, Tama (Imperial Star), 2 yrs. old, list for \$2,600, sell for \$1,900. Call Whitnah, 481-2854 after 5 p.m.

Kraco graphic equalizer with fader control, \$50. Call Whitnah, 481-2854 after 5 p.m.

Open-front doll house kit (Concord Country Victorian), never opened, cost \$100, will sell for \$60. Call Nancy, x4381.

King size sheet sets, fitted, top, etc., cost \$75, sell for \$35. Never opened. Call Nancy, x4381.

Travel trailer, 27' 1978 Yellowstone, excellent condition, \$5,500. Call Schroeder, x4300 or 482-5536.

Fifty sq. ft. oak parquet tiles and adhesive, unused tiles for \$100, adhesive free with tiles. Call Jeff, x7429 or 482-5393.

35 caliber Marlin rifle, 870 Remington 12 gauge, 22 Remington auto, 22 caliber single 6 Ruger pistol; hand power tools new and used; assorted tool boxes and cabinet, 3 lawn mowers and a great many other items. Call Bruce, 644-4429.

Mink stole, \$250 firm. Call x4415 or 333-2359.

Wire, suitable for telephone or electronic hookup on pools, sell or trade. Call Jim, 486-8564 evenings.

Swimming pool heater, outdoor type, new in the box, purchased for 19K gallon pool, \$150. Call Pat Wilson, x5247 or 477-8585.

Two mink stoles, \$200 and \$300. Call 997-1131 after 5 p.m.